EDITH CREEK BRIDGE
Mount Rainier National Park
Spanning Edith Creek on loop road in Paradise Park
Longmire Vicinity
Pierce County
Washington

HAER No. WA-46

HAER
WASH
27-LONG.V
8-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
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I. INTRODUCTION

Location:	Spanning Edith Creek on Paradise loop road in Paradise Park, 1/3 mile east of Paradise Inn, Mount Rainier National Park, Pierce County, Washington. Quad: Mt. Rainier East, Wash. UTM: 10/597000/5182480
Date of Construction:	1925-26
Structure type:	Stone-faced reinforced concrete filled spandrel arch bridge
FHwA Structure No.:	9450-017P
Designer and Engineer:	Nathan W. Morgan, Bridge Engineer, Engineering Division, National Park Service, Portland, Oregon
Contractor:	Feldschau and Chaffee, Tillamook, Oregon
Owner:	Mount Rainier National Park, National Park Service
Use:	Park road bridge
Significance:	Situated at the base of scenic Edith Creek Falls, this small bridge typifies the National Park Service's "rustic style" of architecture through its use of a rough stone veneer to conceal its simple reinforced concrete arch.
Project Information:	Documentation of the Edith Creek Bridge is part of the Mount Rainier National Park roads and Bridges Recording Project, conducted in summer 1992 by the Historic American Engineering Record. Richard H. Quin, Historian, 1992

II. HISTORY

This is one in a series of reports prepared for the Mount Rainier National Park Roads and Bridges Recording Project. HAER No. WA-35, MOUNT RAINIER NATIONAL PARK ROADS AND BRIDGES, contains an overview history of the park roads. In addition, HAER No. WA-119, NISQUALLY ROAD, contains more specific information on the road on which the Edith Creek Bridge is located.

Nisqually Road

The "Government Road" or Nisqually Road, built by the U.S. Army Corps of Engineers between 1904 and 1915, was the first road constructed in Mount Rainier National Park. It was designed by Eugene V. Ricksecker, a talented civilian engineer for the Corps' Seattle office, and is remarkable for its sensitive relationship to the magnificent park landscape. The road climbs on a steady grade not exceeding 4 percent from Longmire to Paradise, taking in fabulous vistas and providing access to old-growth forest, waterfalls, a retreating glacier, and finally, the lush subalpine meadows of Paradise Valley. Although reconstructed in the 1920s, the road still follows the original route for most of the distance to Paradise. The road is the principal thoroughfare in Mount Rainier National Park and the only park road maintained for winter travel.

The 18.4-mile Nisqually Road begins at the Nisqually Entrance, seven miles east of Ashford, Washington. It is a continuation into the park of the old "Mountain Highway" from Tacoma, now numbered as State Highway 706 outside the park boundaries. After passing the reconstructed "rustic style" entrance arch and log entrance station, the road continues east through stands of enormous old-growth trees, reaching Longmire at mile six. It stays on the northwest side of the Nisqually River and continues northeast to a crossing of Van Trump Creek at the Christine Falls Bridge [HAER No. WA-48]. From there, the road runs east to cross the Nisqually River at the Glacier Bridge [HAER No. WA-61], then climbs and loops back to the southwest to Ricksecker Point. The main road follows a 1921 cut-off road here; the old road ran around the outer edge of the point. Running generally west again, the Nisqually Road reaches Narada Falls. Here again, the main road now follows the route of another 1921 cut-off road; the old route, which crossed the Paradise River First Crossing Bridge [HAER No. WA-47] and climbed a series of switchbacks to Inspiration Point, has been abandoned. From Narada Falls, the present road loops through the marshy bogs of Frog Heaven and then turns northwest onto a modern (1958) road segment for the final approach to Paradise Valley. The old road is met again near the Paradise Inn, where it runs east and south as a one-way road, crossing the rustic Edith Creek and Paradise River Fourth Crossing [HAER No. WA-45] bridges before dropping to Inspiration Point. For its final segment, the Nisqually Road turns east again to cross the Paradise River Second Crossing Bridge [HAER No. WA-62] and just beyond, a juncture with the old road.

Edith Creek Bridge

Edith Creek Bridge is a single-span reinforced concrete earth filled stone-faced spandrel arch bridge. It crosses a small tributary stream of the Paradise River, which issues from the southwest arm of the Paradise Glacier below Panorama Point. The structure is part of the one-way Paradise Valley loop road, and is located approximately one-third of a mile northeast of the historic Paradise Inn.

The bridge was built as part of the mid-1920s reconstruction of the upper Paradise road under the supervision of the National Park Service Engineering

Division. The creek was previously crossed by a wooden bridge, termed substandard in park reports but not otherwise described.

The structure was designed by Nathan W. Morgan, Senior Bridge Engineer for the National Park Service Engineering Division, based in Portland, Oregon. The design was approved by Bert H. Burrell, Acting Chief Civil Engineer for the Park Service, on 10 August 1925.[1] Engineer Morgan prescribed a simple reinforced concrete arch bridge with stone facing for the crossing. Some slight revisions were made to the original plans; Morgan submitted a revised sketch for the plans for the east abutment on 15 September.[2]

The contract for the bridge was awarded on 8 August 1925 to F. C. Feldschau and George Chaffee of Tillamook, Oregon, doing business as Feldschau and Chaffee. The Edith Creek Bridge was contracted along with the Paradise River First Crossing [HAER No. WA-47], Second Crossing [HAER No. WA-62] and Fourth Crossing [HAER No. WA-45] bridges at a combined cost of $21,592.50. As part of the same contract, Feldschau and Chaffee also constructed new bridges at the Tahoma Creek and Kautz Creek crossings of the Nisqually Road west of Longmire.

A temporary bridge had to be built at the site, as the new span would replace the existing bridge. The contractor was also required to construct new roadway approaches; these required substantial stone retaining walls to bear the road. The temporary bridge was erected across the stream at a cost of $438.50. This bridge had to be built over the old structure, requiring heavy and high false work.[3]

The preliminary work at the site, including construction of the temporary bridge and removal of the older span, occupied all of August. This slow start prompted fears from park officials that Feldschau and Chaffee would not be able to complete the bridge before winter set in, and that the span would not be available as planned for the beginning of the 1926 season. Robert N. Kellogg, the resident engineer for the project, criticized the slow pace and poor quality of work performed by the contractor:

> Throughout the work the contractor showed marked evidence of lack of experience in this particular kind of work as well as lack of ability to handle men and work to the best advantage. Some difficulty was had in getting good work done as the contractor seemed inclined to disregard specifications either through ignorance of good workmanship or through intentional slip-shod work to save money, the former being the most probable, although there were occasions when the orders of the engineer were willfully neglected. It was necessary to maintain constant inspection of all work to avoid poor workmanship and to obtain good progress, due partially to the poor class of labor employed and partially to the lack of good management.[4]

Around the first of September, NPS Acting Chief Civil Engineer Bert H. Burrell instructed the contractor to begin working nights in order to rush the work along on the span and the nearby bridge across the Fourth Crossing of Paradise River. He also demanded that the contractor engage a competent superintendent to oversee the work. Some better progress was made for a while, but the new superintendent, who proved to be a relative of one of the contractors, had little experience and the resident engineer reported that the work "gradually drifted back to disorganization."[5]

Actual structural work on the new bridge began in late August with the abutments. Excavation for the east abutment proved difficult, and the contractor was forced to go deeper than had been initially contemplated. Some of the

work included wet excavation, and this required an adjustment in the contract costs. However, the contractor was denied reimbursement for additional costs necessitated by the high expense of construction of the detour bridge.[6]

Excavations for the abutments were completed the second week of September and the reinforcing steel and coarse aggregate for the concrete was stockpiled at the site. In the third week of the month, the formwork for the abutments was erected. The concrete for the abutments was poured in the fourth week and the forms for the arch were partially erected. By the end of the month, the contractor was ready to pour the concrete for the arch. The arch ring was completed on 1 October.[7]

In November, Kellogg recalculated excavation yardage and quantities of materials for the backfill for the structure. However, all work at the site had to be suspended on 16 November on account of winter weather. The concrete work was largely finished, but the placing of masonry was only 75 percent complete. Backfilling, the construction of masonry guard rails and wing walls, and surfacing remained ahead. Retaining walls still had to be built on the downstream side and the timbering had to be removed.[8]

Occupied by work on their other bridges, Feldschau and Chaffee neglected the Edith Creek Bridge for most of the 1926 season to the exasperation of park officials. The final masonry work was not finished until early fall. The granular earth fill was added to the arches in September, and the bridge was finally ready for paving. The bridge was completed and placed in service in October 1926. On 12 March 1927, National Park Service Acting Director A. E. Demaray recommended to the Secretary of the Interior that the bridge be accepted.[9]

Since the bridge was placed in service, the Paradise loop road has been redesignated as a one-way road. Many visitors to Paradise never travel over this section of the road, but return to the Nisqually Road over the valley entrance road from near Narada Falls. These visitors miss the stunning view of Edith Creek Falls that may be obtained from the bridge, one of the smallest spans in Mount Rainier National Park but also one of the most picturesque.

A bridge safety inspection report prepared by the Federal Highway Administration in September 1975 found the bridge in excellent condition. The dead and live load ratings were considered adequate for present requirements. However, the report found the roadway width did not meet current minimum criteria, and that the stone guard walls did not meet current AASHTO specifications. The inspectors estimated the remaining life of the bridge at 25 years.[10]

Description

The single-span structure is of reinforced concrete construction, faced with native stone veneer. The earth-filled spandrel arch rib structure is 39' in length and 25' wide (out-to-out). The deck carries two 10' lanes. The arch has an overall span of 39' and stands 9' above the water; the clear span is 32'. Stone masonry guard walls, 3'6" in height and 2' thick, are located on each side. This wall is topped with a course of flat coping stones. No sidewalk is provided. Stepped wing walls at each end are canted outward at a 45° angle. Both the guard wall and wing walls are constructed of rubble masonry laid in cement mortar. A heavy dry-laid rock masonry gravity retaining wall is located at the south corner; this steep battered wall is comprised of large rough cut stones, laid with smooth outer faces.

The single span arch springs from stub abutments on solid rock skew back foundations. All concrete used was Class "A," except for the bases of the

abutments, where Cyclopean concrete was used.* Outer faces of the spandrel walls and the arch ring are faced with a native stone veneer, 4"-8" inches thick. The stone facing is tied to the spandrel wall with No. 6 gauge galvanized iron wire. Concrete cross beams are used to strengthen the arch and spandrel walls. The spandrel fill consists of a layer of broken stones 8" deep over the arch, topped by a 3" layer of coarse sand, then by well-compacted earth. The roadway is surfaced with asphalt pavement. The bridge was constructed to carry a dead load (snow load) of 500 pounds per square foot, and a live load sufficient to bear a 20-ton steam shovel.

The bridge is located in the lower subalpine zone. Around the bridge site are numerous subalpine firs, many exhibiting the stunted growth characteristic at this elevation. Profuse numbers of native wildflowers, including lupines, mountain anemones, and Indian paintbrush, were observed during the HAER survey in early July. The bridge spans Edith Creek about 125' below Edith Creek Falls, a lovely cascade cutting through a steep rocky canyon. Unfortunately, no parking spots are provided for visitors. As the falls are quite an attraction, motorists park on the narrow shoulder above and below the bridge, sometimes blocking views and presenting safety hazards.

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* Classes of concrete refer to the amount of Portland cement used in the mixture, with Class "A" having the highest proportion and therefore being the strongest. "Cyclopean" concrete is a mixture containing an aggregate of large stones.

III. ENDNOTES

1. U.S. Department of the Interior, National Park Service, Engineering Division, "Edith Creek Arch, Nisqually Road," Construction drawing No. 305, 10 August 1925, credits.

2. Nathan W. Morgan, Bridge Engineer, "Mount Rainier: Edith Creek Arch, East Abutment," Construction drawing revision, 15 September 1925. National Archives, RG 79 Entry 25 Box 1, Mount Rainier Bridges file.

3. U.S. Department of the Interior, National Park Service. "Proposals and Specifications for the Construction of 5 Reinforced Concrete Bridges, 2 Rustic Log Bridges, and Possibly 3 or More Small Reinforced Concrete Culverts Over the Following Streams: Tahoma Creek, Kautz Creek, Christine Falls, Nisqually River (near the Glacier), Paradise River (on the Narada Cut Off), The Fourth Paradise River Crossing, and Edith Creek in Mount Rainier National Park, Washington," Specifications no. 35, n.d. National Archives, RG 79 Entry 25 Box 1, Mount Rainier Bridges file; R. N. Kellogg, Associate Engineer, National Park Service, Mount Rainier National Park, "Weekly Report, Nisqually Bridges, Nov. 29 to Dec. 5," 1-2; Kellogg to Bert H. Burrell, Acting Chief Civil Engineer, National Park Service, Portland, OR, 29 November 1925. National Archives, RG 79 Entry 29 Box 39 File 650, in re: Feldschau and Chaffee; "General Report on Status of Work on Nisqually Bridges," February 13, 1926. National Archives, RG 79 Entry 22 Box 16, "Special Reports file."

4. Kellogg, "Weekly Report, Nisqually Bridges, Nov. 29 to Dec. 5," 1.

5. *Ibid.*.

6. *Ibid.*, 2; Idem, "General Report on the Status of Work on Nisqually Bridges,", 13 February 1926, 3. National Archives, RG 79 Entry 22 Box 16, Special Reports.

7. Kellogg, "General Report," 3; O. A. Tomlinson, Superintendent, Mount Rainier National Park, Superintendent's Monthly Report, September 1925, 5. MORA Archives, Box H2615, Superintendents' Monthly Reports 1924-1927 file.

8. Kellogg, "Weekly Report, Nisqually Bridges, Nov. 29 to Dec. 5," 1-2; Idem, "General Report," 3; Tomlinson, Superintendent's Monthly Report, November 1925, 5. MORA Archives, Box H2615, Superintendents' Monthly Reports 1924-1927 file.

9. Kellogg, "Report on Nisqually Road Bridges, Rainier National Park, 11 September 1926, " 1; R. B. Wright, Highway Bridge Engineer, Bureau of Public Roads, "Inspection Report on Nisqually Road Bridges, Rainier National Park Project," 15 October 1926. National Archives, RG 79 Entry 22 Box 15 File 3; A. E. Demaray, Acting Director, National Park Service, to Secretary of the Interior, 12 March 1927. National Archives, RG 79 Box 1991 File 12/7.

10. U.S. Department of Transportation, Federal Highway Administration Region 8, Office of Western Bridge Design, *Bridge Safety Inspection Report: Edith Creek Bridge, Mt. Rainier N.P., Structure* No. 9450-017P (Denver, CO: Federal Highway Administration, September 1975), 1.

U.S. Department of Transportation, Federal Highway Administration Region 8, Office of Western Bridge Design. *Bridge Safety Inspection Report: Edith Creek Bridge, Mt. Rainier N.P., Structure No.* 9450-017P. Denver, CO: Federal Highway Administration, September 1975.

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Morgan, Nathan W., Bridge Engineer, National Park Service. "Mount Rainier, Edith Creek Arch East Abutment." Construction drawing, 15 September 1925. Attached to Bert H. Burrell, Acting Chief Civil Engineer, National Park Service, Portland, OR, to Robert N. Kellogg, Associate Engineer, National Park Service, Mount Rainier National Park, 15 September 1925. National Archives, RG 79 Entry 22 Box 18.

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--"Edith Creek Arch, Nisqually Road." Construction drawing No. 305, 10 August 1925.

--Construction drawing No. 261, Landscape details, 16 July 1925.